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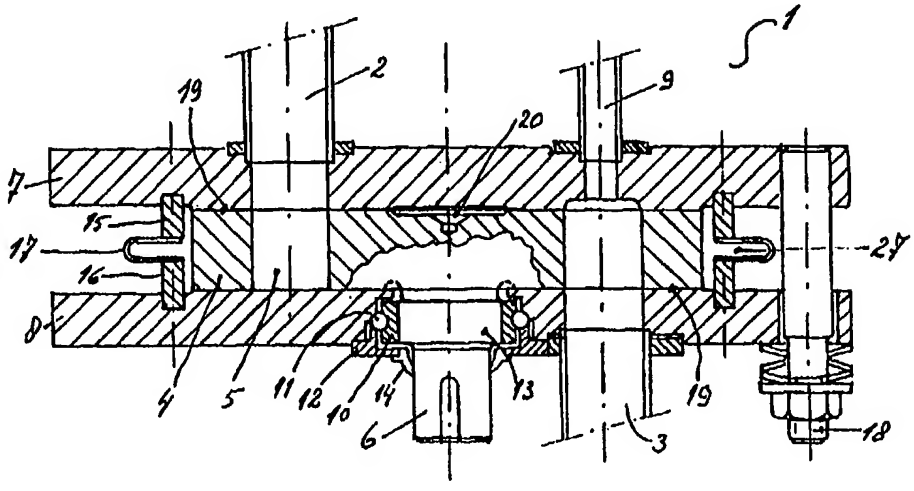
(54) Title: METERING DEVICE FOR CRYOGENIC PELLETS



(57) Abstract

The invention concerns a metering device (1) for cryogenic pellets which are used in a blast cleaning apparatus to treat surfaces. The cryogenic pellets are by example bars of compressed dry ice (carbon dioxide). The metering device (1) is characterised by the use of sliding surfaces which are treated with a layer of nickel which contains ceramic material or sapphire powder. The metering device (1) has a metering disk (4) with openings (5) which while turning pass the intake opening (2) and thereafter pass the exhaust (3) opening where the pellets are transported to the mixing unit (25). The metering disk (4) is confined between plates (7, 8) where inbetween an elastic seal (15–17) is placed. The plates (7, 8) are pressed against the metering disk (4) with sets of springs. The metering device (1) has no ventilation openings for the openings (5) in the disk (4) and the space around the disk is not ventilated. The metering disk (4) has only one axis (6) with a bearing (10).

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Metering device for cryogenic pellets.

The invention concerns a metering device for cryogenic pellets which are used in a blast cleaning apparatus for treatment of surfaces. The cryogenic pellets are by example bars of compressed dry ice (carbon dioxide).
Metering devices are known from the publication NL-A-9301237. It is found that this device does not function well because the metering device constantly freezes because the metering disk is not sufficiently isolated from the outside air. It is found that the metering disk needs a special surface treatment as lubricating is practical impossible as the operating temperature is about minus 80 degrees Celsius.

The invention will neutralise these disadvantages by providing the sliding surfaces with a layer of nickel containing very fine ceramic particles, like sapphire with a particle dimension of about 6 micron. Besides the metering disk is pressed between two plates which are elastic but gas-tight connected. The device is completely sealed except the intake and exhaust openings. Ventilation openings are entirely avoided.

The invention will be described with the drawings.

Fig. 1 shows a cross section over the metering device.
Fig. 2 shows the schema of the blast cleaning installation.

In the drawings is the isolation of conduits left out.
In Fig. 1 is with (1) the metering device indicated. At (2) is the supply of pellets, at (3) the exhaust. With (4) is indicated the metering disk. Metering disk (4) is preferably provided with 8 round holes (5) and is driven by shaft (6). Metering disk (4) rotates between plates (7, 8) where plate (7) carries the supply of pellets (2) and the supply of transport gas (9). Plate (8) carries the bearing with bearing ring (10), synthetic ring (11), securing ring

(12) and bearing surface (13). Seal (14) seals shaft against humidity. Synthetic ring (11) fastens bearing ring (10) in such a way that small oscillations of shaft (6) are absorbed, where at the same time the bearing construction is sealed against penetration of humidity. Between plates (7) and (8) is a metallic seal, put together from ring (15) and ring (16) where between is mounted a thin metal bellows (17) and it is preferred that the connection is made by welding. metering disk (4) has only one shaft end (6).

At (18) is one of more tightening bolts which press plates (7) and (8) against metering disk (4) with disk springs.
The surface (19) of metering disk (4) and plates (7) and (8) is treated with a layer of nickel which is filled with powdered sapphire with a particle dimension of about 6 micron or any other feasible ceramic material. This layer has a low coefficient of friction and can be used as sliding surface without lubricating. The bearing surface (13) and the inside surface of bearing ring (10) are treated the same way.
Plate (7) and (8) are reduced in thickness and at (20) is machined a recess to prevent irregular wear.
Fig. 2 shows the design of an installation. (21) is the storage chamber, (22) the supply of compressed gas, at (23) are valves and at (24) a reducing valve for transportation gas. (25) is the mixing part and (26) the blasting nozzle.

The blast cleaning installation works as follows: with shaft (6) metering disk (4) is rotated with a (not drawn) variable speed motor. From storage chamber (21) pellets fall via supply (2) in opening (5). When opening (5) arrives before exhaust (3) the pellets are blown by the transportation gas into exhaust (3). The pellets are then going via mixing part (25) with compressed gas to blow nozzle (26).

It is important for a reliable operation that metering disk (4) is shut off from the outside air. The space (27)

between metering disk (4) and seal (15, 16 and 17) is not ventilated. Remaining gas, resting behind in opening (5) after the blowing off of the pellets is not expelled. In the case that sublimation of for example carbon dioxide in the metering device (1) causes high pressure plates (7) and (8) will part and the gas will be released via supply (2) or exhaust (3) and provoke no damage.

Claims.

Metering device for cryogenic pellets for treatment of surfaces which is provided with a metering disk (4) with circular openings (5) where the cryogenic particles are carried with compressed gas to a mixing part (25) characterised by that metering disk (4) rotates between two flat plates (7, 8) which are tightened with springs, where plate (7) is provided with the supply opening (2) and the transport gas opening (9) and in plate (8) the shaft bearing (10, 11, 12 and 13) and the exhaust opening (3), while the plates (7, 8) are bound together with sealing ring (15, 16) which is provided with an elastic metal bellows (17).

2. Metering device as in claim 1 characterised by that all sliding surfaces of metering disk (4), plates (7, 8), bearing surface (13) and bearing part (10) are treated with a layer of nickel with ceramic particles or sapphire.

3. Metering device as in claim 1 and 2 characterised by that the metering disk (4) contains 8 openings and only one shaft (6).

4. Metering device as in claim 1, 2 and 3 characterised by that bearing ring (10) for shaft (6) is secured with a prestressed synthetic ring (11).

5. Metering device as in claim 1, 2, 3 and 4 characterised by that openings (5) in metering disk and space (27) around metering disk (4) are not ventilated.

* * * *

FIG 1

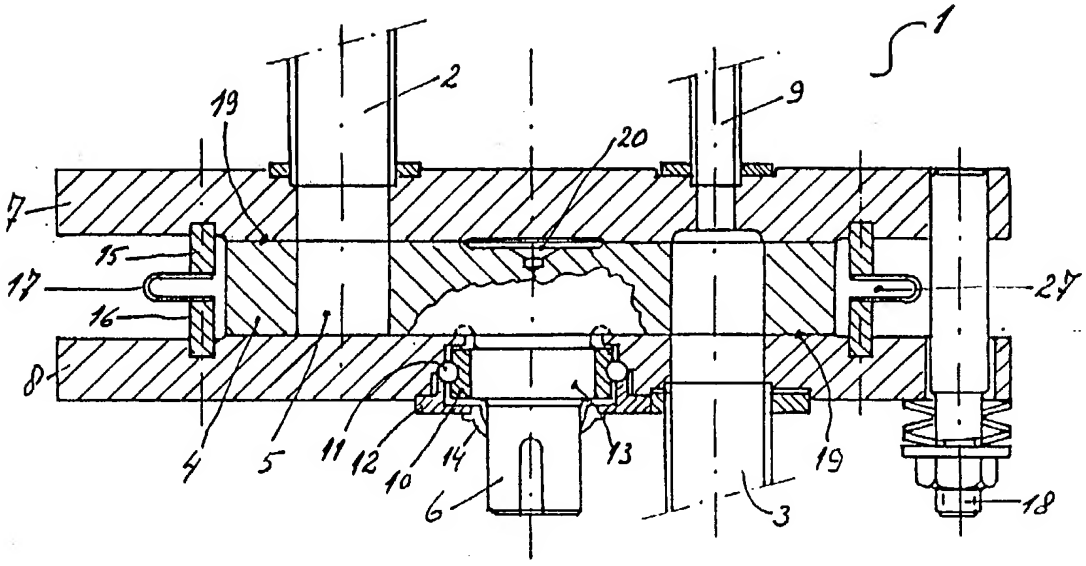
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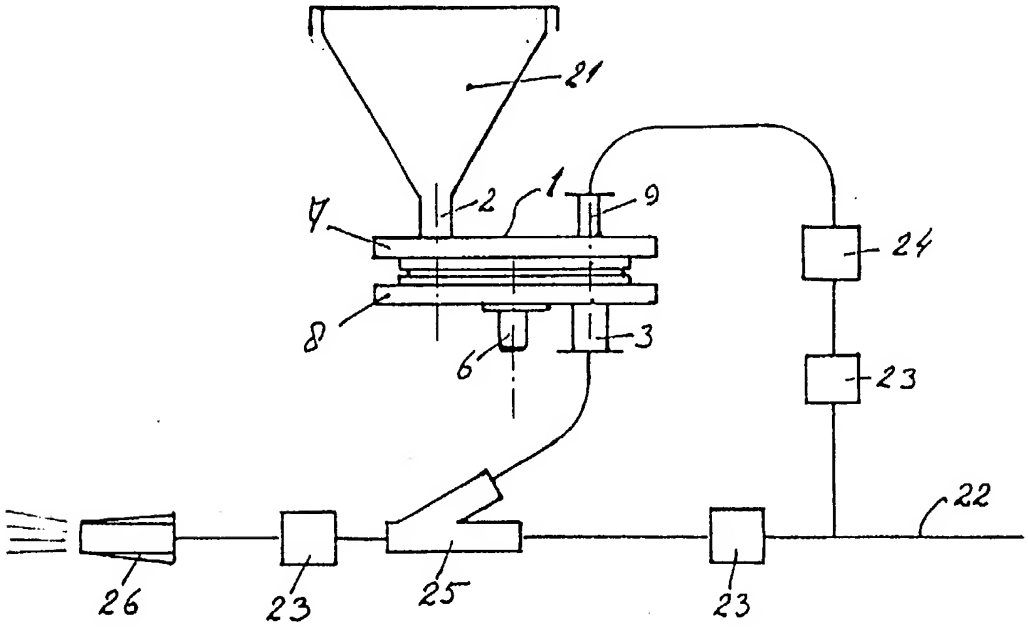
FIG 2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INTERNATIONAL SEARCH REPORT

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PCT/NL 98/00613

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 B24C7/00 B24C1/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 B24C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 389 820 A (FONG CALVIN C ET AL) 28 June 1983 see column 6, line 5-17; figures 8,9	1,2,5
A	US 4 617 064 A (MOORE DAVID E) 14 October 1986 see the whole document	1,3
A	NL 9 301 237 A (HARKO BV) 1 February 1995 cited in the application see the whole document	1
A	US 4 538 068 A (HANEY STEVEN J ET AL) 27 August 1985 see column 4, line 35 - column 5, line 23; figures 1,2	2

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